

## Structural and Failure analysis of JIB Crane Structure

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### ABSTRACT

The main objective this project to analyze the structural capability of jib crane for different load condition 0.5ton, 1ton, 2ton. Jib crane designed in solid work and FEA software used for static structural analyzes, then results of deformation, equivalent stress, strain and safety factor compared for given load condition.

**KEYWORDS:** FEA, Solid works, Static structural stability

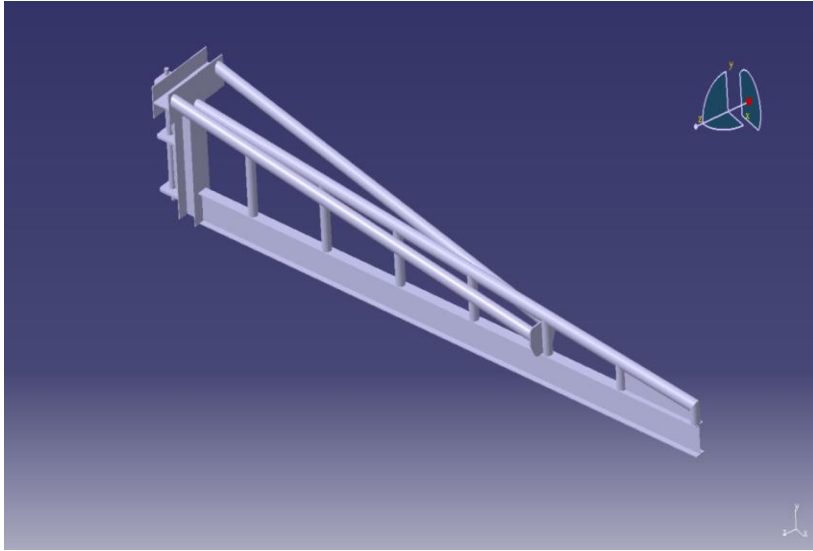
### I. INTRODUCTION

In this research work we going to analyze the cantilever beam with different point load condition. That mean we going to analyze static structural capability of the jib crane with various point load condition.

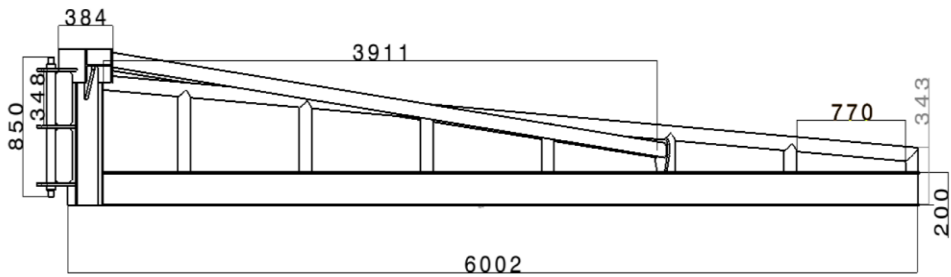
Based on holding time, load and length of the crane the shear force and bending moment of the structure will varying, here we used cantilever beam with various point load with constant time and length of the crane.

The jib crane designed in solid works with required dimension, Structural mesh used for meshing and analyzes is done on jib crane by using FEA software. The results are took for static structural analyze like total deformation, equivalent stress and strain then we analyze the safety factor of the structure various load condition for particular time. Here the loads are 0.5 ton, 1 ton, 2 ton.

Finally we compare the all results for given load condition with help simulation and graphical results then conclude whether the jib crane is withstand for all load condition



**FIG1.3D MODELLING OF JIB CRANE**



**FIG2.2D DRAFTING OF JIB CRANE**

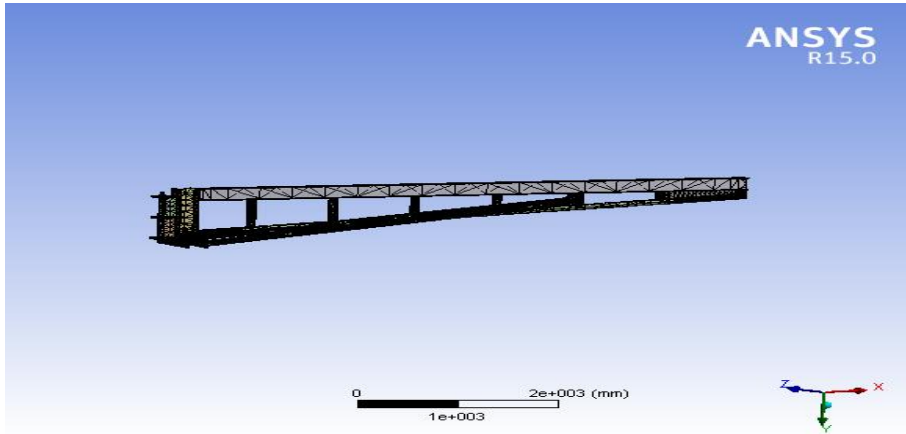


FIG3.MESH MODEL OF JIB CRANE

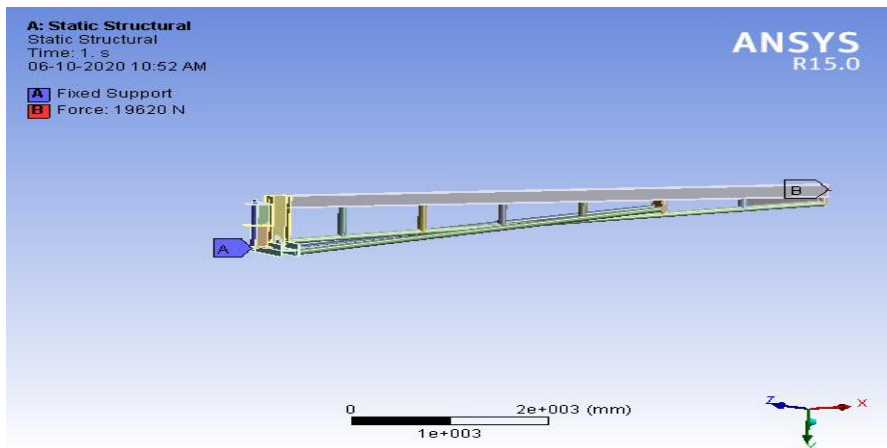
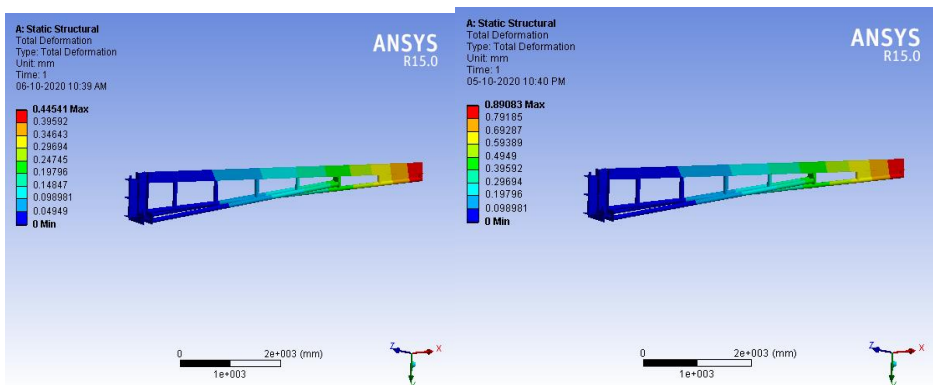


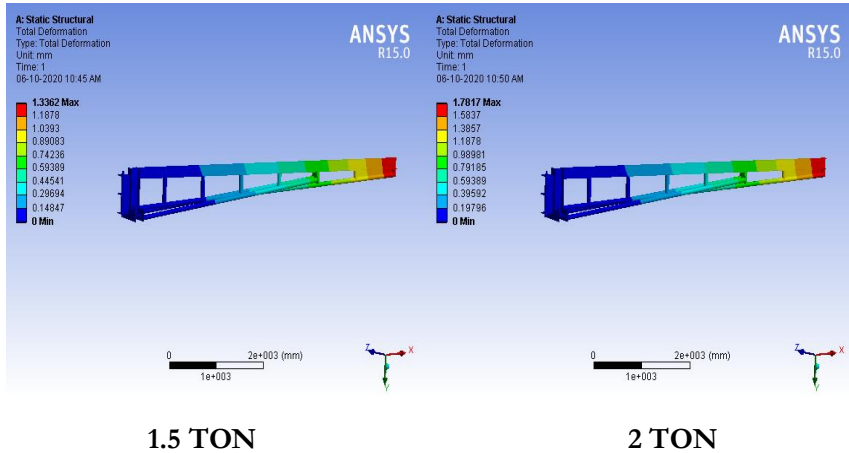
FIG 4.BOUNDARY CONDITION OF JIB CRANE

TOTAL DEFORMATION



0.5 TON

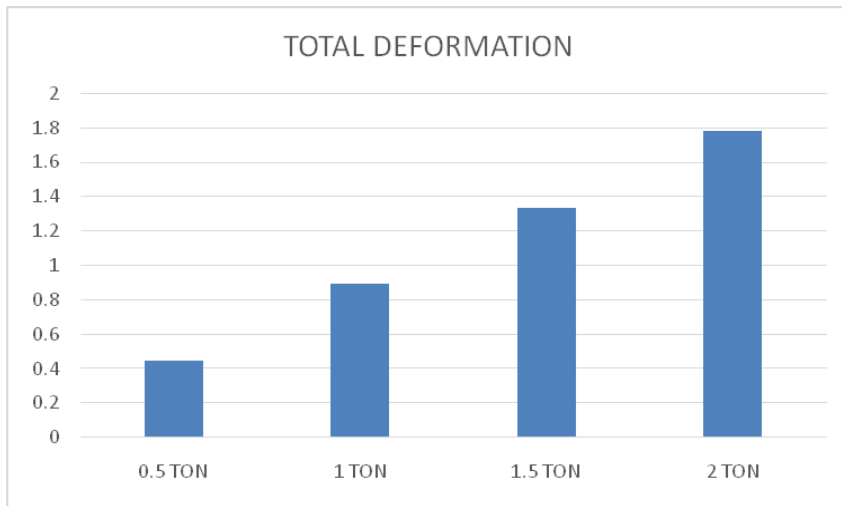
1 TON



**FIG 5. TOTAL DEFORMATION RESULTS OF JIBCRANE**

TOTAL DEFORMATION	0.5 TON	1 TON	1.5 TON	2 TON
	0.44541	0.89083	1.3362	1.7817

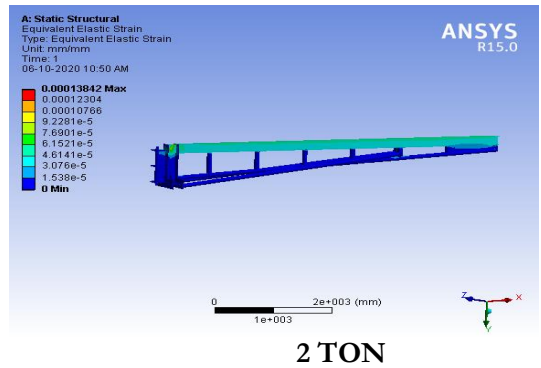
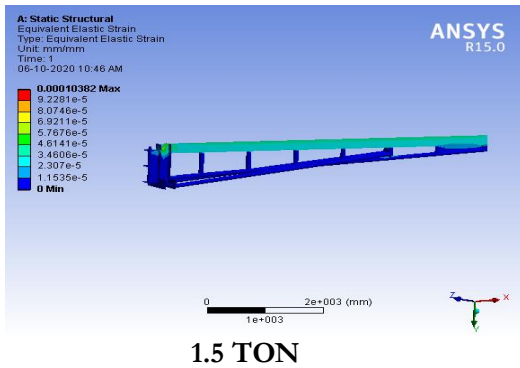
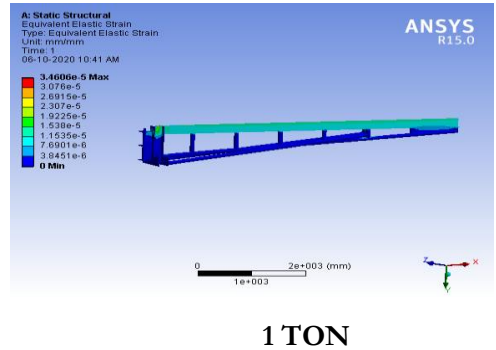
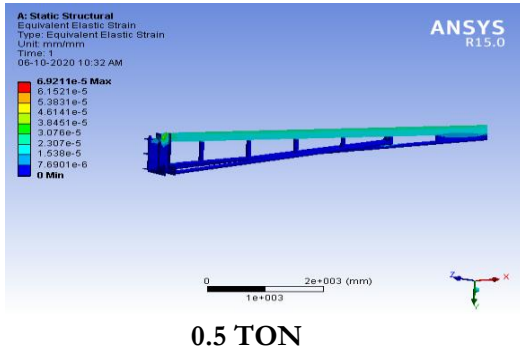
**TABLE.1 TOTAL DEFORMATION RESULTS**



**GRAPH1.TOTAL DEFORMATION RESULTS**

In this graph the deformation starts from 0.444541mm at the weight of 0.5 ton. As the amount of weight increases the amount of deformation also increases linearly. So we got the maximum deformation of 1.7817mm at the weight of 2ton.

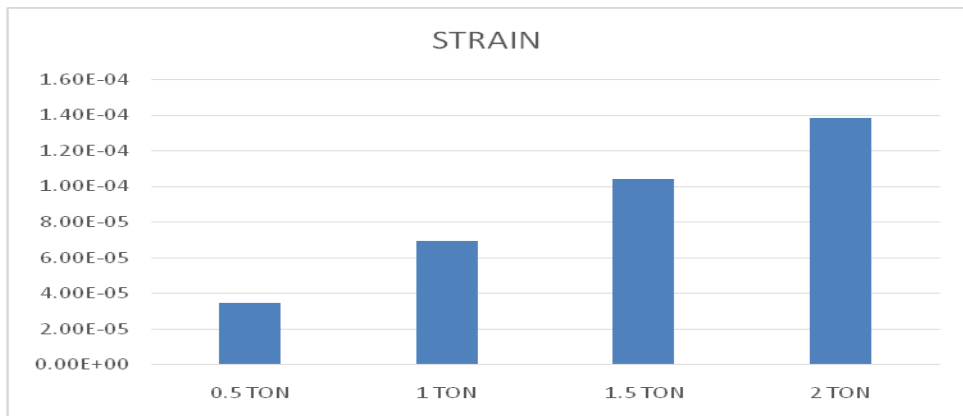
**STRAIN**



**FIG.6 STRAIN RESULTS OF JIB CRANE**

STRAIN	0.5 TON	1 TON	1.5 TON	2 TON
	3.4606	6.9211	0.000104	0.000138

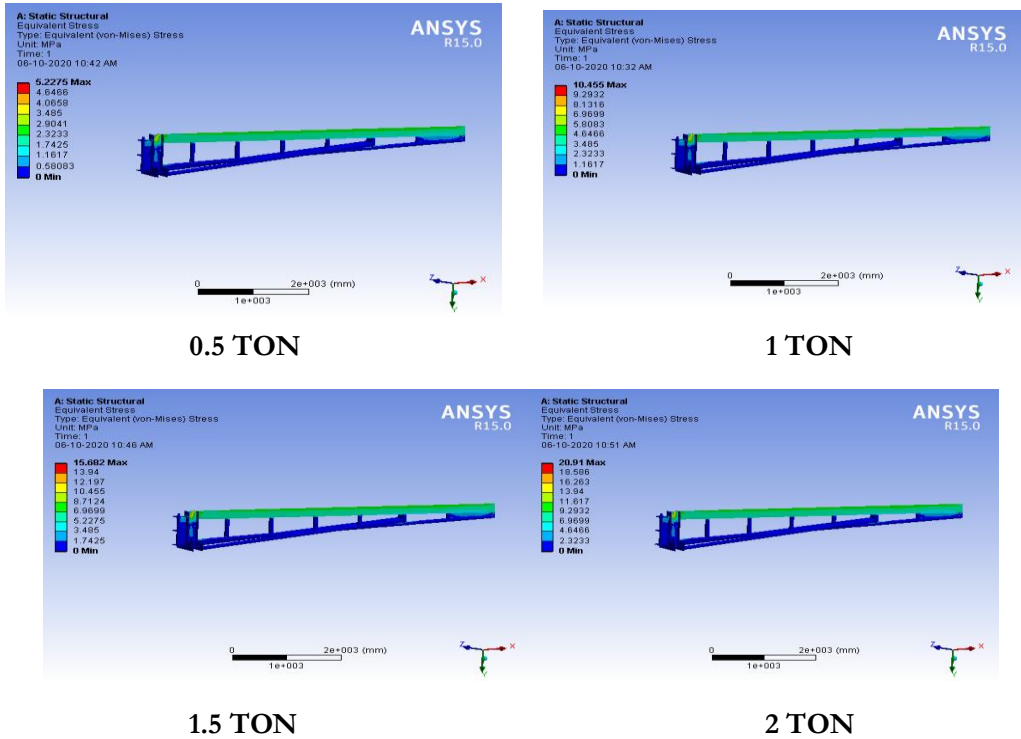
**TABLE2.STRAIN RESULTS**



**GRAPH2.STRAIN RESULTS**

In this graph the strain value starts from 3.4606at the weight of 0.5 ton. Here the graph decreases as the weight increases. we got minimum strain of 0.00013842at the weight of 2ton.

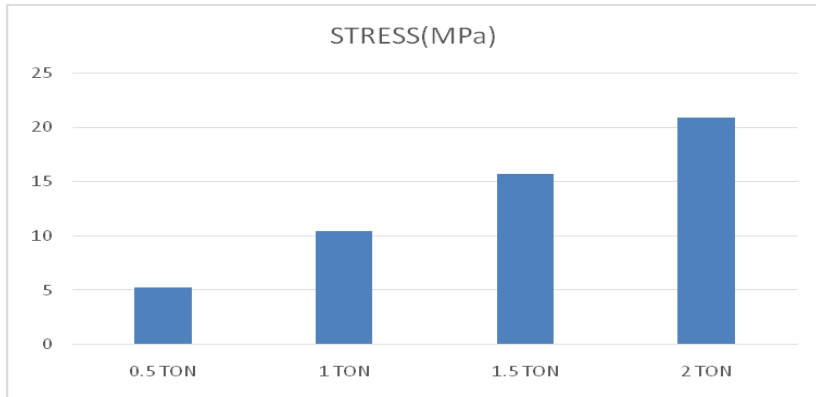
**STRESS**



**FIG.7 STRESS RESULTS OF JIB CRANE**

STRESS	0.5 TON	1 TON	1.5 TON	2 TON
	5.2275	10.455	15.682	20.91

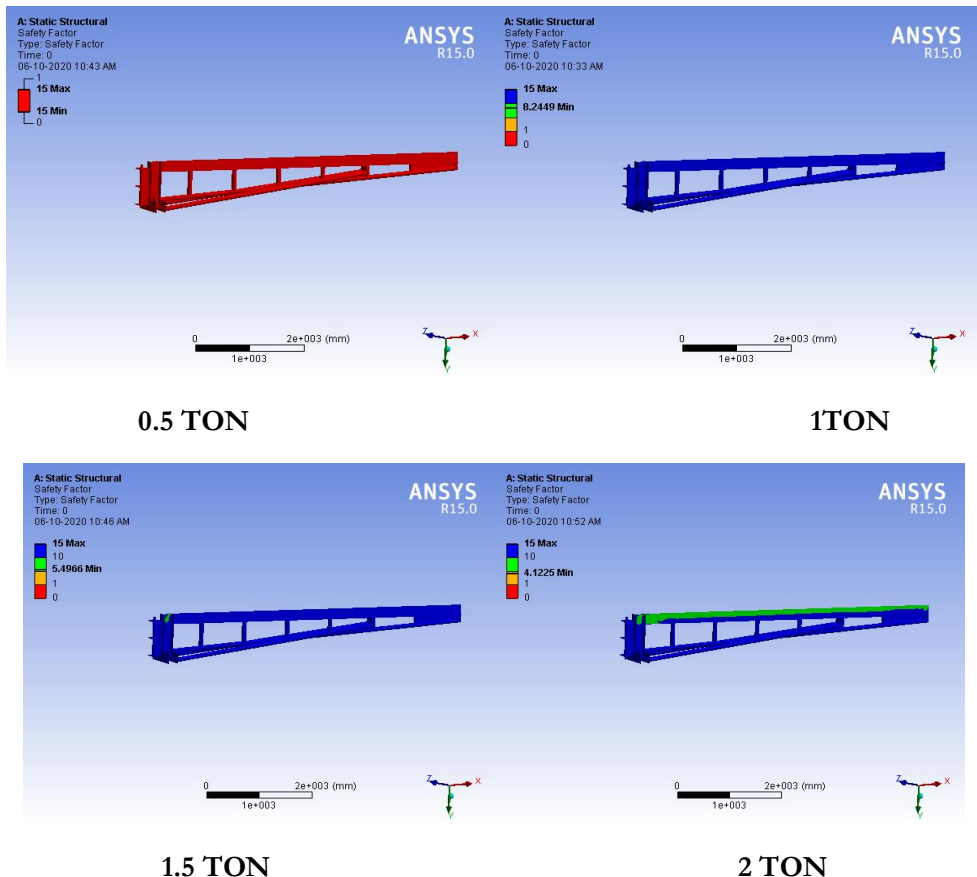
**TABLE 3.STRESS RESULTS**



**GRAPH3.STRESS RESULTS**

In this graph the stress value starts from 5.2275 at the weight of 0.5 ton. Here the graph decreases as the weight increases. So we got minimum stress of 20.91 at the weight of 2 ton.

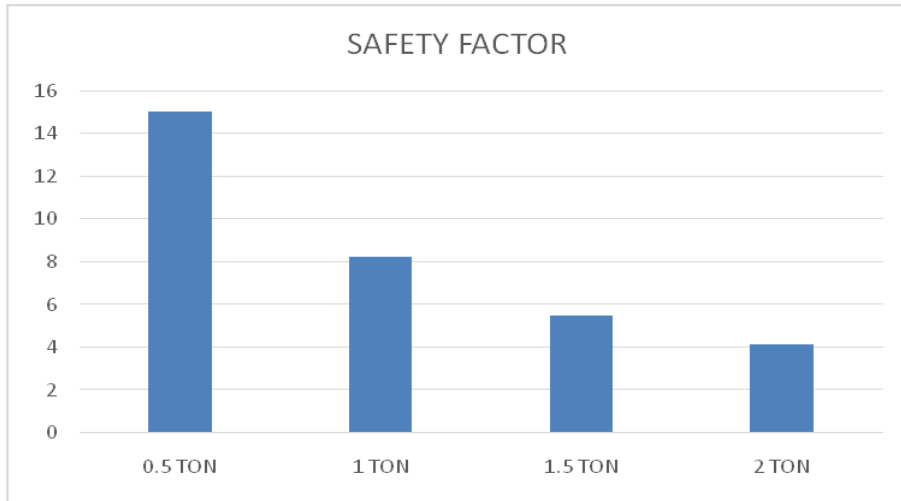
**SAFETY FACTOR**



**FIG.8 SAFETY FACTOR OF JIB CRANE**

SAFETY FACTOR	0.5 TON	1 TON	1.5 TON	2 TON
	15	8.2449	5.4996	4.1225

**TABLE4.SAFETY FACTOR OF JIB CRANE**



**GRAPH4.SAFETY FACTOR RESULTS**

In this graph the safety factor starts from 15 at the weight of 0.5 ton . As the weight increases the amount of safety factor decreases. So we got minimum safety factor of 4.1225 at the weight of 2 ton.

**II. CONCLUSION:**

Comparing the simulation and graphical results the jib crane can able to withstand the all-load condition for given dimensions, from analyse results we can operate this jib crane up to 2 ton without any structural deformation the safety factor is high for 0.5 ton compare than the other load condition.

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